10/593790 IAP9 Rec'd PCT/PTO 25 SEP 2006

NEB-241-PUS.ST25.txt SEQUENCE LISTING

ì

```
<110>
       New England Biolabs, Inc.
       Morgan, Richard
Wilson, Geoffrey
       Lunnen, Keith
       Heiter, Daniel
       Benner, Jack
Nfenfou, Celine
Picone, Stephen
       A Novel Modular Type II Restriction Endonuclease, CspCI, and the
<120>
       Use of Modular Endonucleases for Generating Endonucleases with
       New Specificities
<130>
       NEB-241-PUS
       60/555,796
<150>
<151>
       2004-03-24
       PCT/US05/09824
<150>
       2005-03-23
<151>
<160>
       49
<170>
       PatentIn version 3.2
<210>
<211>
       61
<212>
       DNA
       unknown
<213>
<220>
<223> synthetic
<220>
<221>
       misc_feature
<222>
       (12)..(12)
<223>
       n=a,c, g or t
<400> 1
ccccgaaaag tnccacctga cgtgcaacct aggtggcacg tctaagaaac cattattatc
                                                                           60
                                                                           61
a
<210>
       2
<211>
      61
<212>
      DNA
<213> unknown
<220>
<223>
       synthetic
<220>
       misc_feature
<221>
<222>
      (14)..(14)
<223>
       n=a,c, g or t
tgataataat ggtntcttag acgtgccacc taggttgcac gtcaggtggc acttttcggg
                                                                           60
                                          Page 1
```

g		61		
<210> <211> <212> <213>	3 61 DNA unknown			
<220> <223>	synthetic			
<220> <221> <222> <223>	misc_feature (12)(12) n=a,c,t or g			
<400> ccccga	3 aaag tnccacctga cgtgccaccc gggttgcacg tctaagaaac cattattatc	60		
a		61		
<210> <211> <212> <213>	4 61 DNA unknown			
<220> <223>	synthetic			
<220> <221> <222> <223>	misc_feature (14)(14) n-a,c,g or t			
<400> 4 tgataataat ggtntcttag acgtgcaacc cgggtggcac gtcaggtggc acttttcggg				
tgataataat ggtntcttag acgtgcaacc cgggtggcac gtcaggtggc acttttcggg				
<210> <211> <212> <213>	5 4616 DNA unknown			
<220> <223>	Citrobacter species 2144			
<400> agatct	5 gcca atactgtttc gacagcgcca cttaattcct tcaatttcgc gcaggttaga	60		
tggcac	ttgt tcggaagagg cgtctgtaac tcggtctcaa gctgcgggat tgccccggta	120		
ttttgc	tcat ccccttttaa ttcaacgatc atctgctgaa aagtcagacc ctcacgatag	180		
tcagag	gcca gcttctgttc ctcagatgcc agccctttca gatcggtctt acccgtctct	240		
agttgt	tggg ttgccccatc aagagtgcgg cgtttttctg ccaattgagt agcttttaca	300		

cccgtcagat	cgatatatct	ggcatcaatc	NEB-241-PUS. gccgaagtaa		aaaatcatta	360
aatgcatcca	gcccaaataa	cgttgagata	agttcagtct	gtcttgccgg	ggccagcgcc	420
gctattcttg	agaagttgtc	aattcggttt	ttttcaacaa	agcaaaagcg	gtgctgtgct	480
tcgttatgct	caattgctaa	atcctgtcct	tgctctccta	cgccagtaat	tacaggtgca	540
gaaaactgat	cgacatgtgc	atttctaaaa	tagtcggttt	gattacgaaa	acgcttacta	600
tcagcctcag	ctacgctacc	cagtaatgta	tattcaagcg	cttcgcagaa	actggacttc	660
ccggtaccat	tggggccata	aatcagcacc	agacgcgaat	ccaggtcaaa	ttcctcctgt	720
ctggcaaatc	ctctgaacgg	tccaacggac	aacctcctga	gtcgattgaa	agtggagacg	780
cgttcgttgc	tttgttcagg	cagtggctgg	acttccaggc	tgagggtatc	ccaggcaggt	840
tgcgccagat	cgacgatacg	ccttatccgc	tgtccctgtg	aggtacctaa	cgggataata	900
ttatccagat	tatcccatac	aagattcgcc	atttttctga	catcaccggg	tatatctgct	960
gtgtctaaag	tttggaaaaa	gcgtaaaaac	tcgttactga	gcattatgaa	tcctttttta	1020
cttgtcgttt	tctcacgtta	taagacaatg	ataaaagata	cactcttagc	taacgtattc	1080
acgtgatctg	tagatcaatt	atcttcagtt	ccgctctcaa	gctgaactga	accgggatga	1140
agacggtatg	gcgcttgcca	cactagtaca	ggtgtattac	taaaaaaccg	aaaggtattc	1200
gataaagccg	attacaacgc	gttggtggac	aacaccgaag	ccacgctcgg	cgatgaactg	1260
gtggcaaaga	aagaaataca	ggtccgccgg	gagtaaacgt	ccaccttcat	caagccgatg	1320
gatgagcagg	cgtaatatgt	cgcagtgctt	gcgaagcgcc	gtactccgga	tgtgcgcaag	1380
aacgactgac	gtctggtact	gagccgtgac	gatctggcct	ctgatgggcc	cgcattaatg	1440
agatggtaaa	tcctcactaa	tattgaaggc	aaaaaataaa	ggtctccaaa	atcgactctt	1500
gtaaagaggc	ttgcgaggcc	ctcctgcact	ctagccatag	ttcggaattg	gtcgttaaaa	1560
tgtcgtacac	taccatcatt	ttaaaatcga	aatggaatat	tgaatggcga	acgaacgcaa	1620
aacagaatcc	ttagttcgag	accagctacg	gacatttggc	tactacgaac	cggacaacgg	1680
catttctgta	gaggagcaaa	agtccgagat	tgtcaagatt	aagggtttgc	tttcaaaagc	1740
aagtaagaac	gccaagggca	atattggtta	tcccgagttc	atcatctcta	accggaaaga	1800
tactgcattc	ctgatagttg	tggagtgcaa	gccggatgtg	aaaaagcacg	agagcccaag	1860
ccgtgataag	ccggtagact	atgcggtgga	tggcgttctc	cactacgcca	gacacctagc	1920
caagcactat	accgtattgg	cggtggctgt	gagcggcacg	acggcaagtt	ctatgaaggt	1980
gtccaacttc	cttgtgcctg	cgggtaccac	ggatgtgaag	gcgctggtca	acgagagtaa	2040
ttcctcagtt	gccgaattgg	tgccttatga	tgactactac	cgcctggcgt	cttatgatcc	2100
ggatgttgct	cagaagcgcc	actctgactt	gctggcgttc	tcacgcgagc	tgcacgagtt	2160
tatttggacg	aaggcaaaaa	tctccgaaga	agaaaagcct Page	ctgctggtga 3	gtgggacctt	2220

gattgcgttg	atgaacaaca	cattcatcaa	gacctttgac	gctctacctg	cagaagatgt	2280
gcaggaagcg	tggctgacgg	ctatcaagaa	ggagctggac	aaagcttcta	tccccaggc	2340
caagaaggac	acgatgctgc	agccgtatac	gacgattgcg	gttaatccca	atcttggcaa	2400
gcctgacagc	aagacggcta	aagagtatcc	agatggagtt	ttcaaggaaa	taatcacccg	2460
catcgccgac	aacgtctggc	cctacatcaa	tgtctttcac	gactttgatg	tggtcggaca	2520
attctacggt	gagtttctga	aatatactgc	gggcgacaaa	aaagcgctgg	gcatcgtgct	2580
gacgccgcgc	catgtggctg	aactgttctc	gctcatcgcc	aacgttaacc	ccaagtctaa	2640
ggtgctggac	atctgtgcgg	gcacgggcgg	ctttctcatc	tcggccatgc	aacacatgct	2700
caagaaggcc	gtaacggaca	aagagcgcaa	cgacatcaag	caaaatcggc	tcatcgggat	2760
tgaaaacaac	cccaagatgt	ttgccttggc	tgccagcaac	atgattctgc	gtggtgatgg	2820
taaggctaac	ctgcaccagg	ccagttgctt	tgataatgca	gtgattgcgg	ccgtgcagaa	2880
gatgaagccc	aacgtgggca	tgcttaaccc	cccgtattcg	cagtccaaga	gcgacgcgga	2940
actgcatgag	ctgtatttcg	tcaagcaaat	gctcgacacg	cttacaccag	gtggagttgg	3000
tatcgcgatt	gttcccatgt	caagcgccat	ctcgcccaac	ccaatgcgtg	aagagctgat	3060
gaagtaccac	tcactggatg	cggtcatgtc	aatgccccag	gagctgtttt	atccagtggg	3120
cacggtcacc	tgtgtcatgg	tctggattgc	cggtgtgcca	catgagcaaa	tgtccaagaa	3180
gacatggttt	ggctactggc	gcgacgatgg	ctttgtgaaa	accaagcata	aggggcgcat	3240
cgacatgaat	ggcacctggc	cagacatccg	tgaccgatgg	attgaaatgt	atcgcaatcg	3300
cgaagtgcat	gctggcgaga	gcatcatgca	gaaggtaggc	cccgatgatg	aatggtgcgc	3360
tgaagcctat	atggaaacgg	actactcagt	gctgactcag	tccgactttg	agaaggtcgt	3420
tcaaagctac	gcgctattta	aactatttgg	tcaaggcagt	agccagtccg	aagtgaaagg	3480
ggcaacggat	gccgaagatt	aacgaccttt	ttcatctgga	gtacggtcac	agcctggagt	3540
tgaaccggct	agagcaatcc	acagcagccg	atgccgtcaa	cttcgttgga	cgggcagcta	3600
ggaacaatgg	agtcaccgca	cgcgtggctc	cccctccaaa	cttgaaaccg	gcagccgcag	3660
gcaccatcag	cgtagcgctg	ggagggcaag	gtggcgcagg	agtcgccttc	ctccaaccgc	3720
gtccctactt	ttgtggccgc	gatgtgatgg	tgctgacccc	caagaagcac	atgacagacc	3780
aagaaaagct	gtggtgggtc	atgtgcatca	cagccaaccg	tttccgcttt	ggatttggtc	3840
gccaagctaa	tcggacgcta	aaggacttga	atctgcctgc	gccccaaaaa	actccaagct	3900
gggtgcatac	agcgaacccc	gatgcctacc	aaggtgtcag	gtcccccgca	agtgttcatc	3960
cagtcggcac	gctggctgtg	agcaactgga	aggctttcat	tcttcaagac	ttgtttacca	4020
tccgtaaagg	acagcgactc	accaaggcca	acatgttgcc	cggtacggtg	ccctacatcg	4080

NEB-241-PUS.ST25.txt gcgcatcgga cacttccaac ggcgttactg cgcacatcgg gcaaaaacca atccacgagg	4140
gcggcaccat cagcgtcaca tatgacggtt caatagctga agcgttttac cagccctccc	4200
cattttgggc atcggatgct gtgaacgtgc tctatcccaa gggtttcaca ctcacaccgg	4260
ccactgcctt gtttatctgc gcaatcatca ggatggagaa atatcgcttc aactatggcc	4320
gaaaatggca cttagagcgt atgcgagaga cagttatcag gttaccagct actgcaacag	4380
gtgcaccaga ttgggacttt atggagaaat acatcaaaac tttgccctat agctcgcagt	4440
tgcaataatc atggctgatt tcctaaattt cctgccgcat ctacgggtat tgcatgttca	4500
ggacggtggt gatcatcgct aggtggaggc ggaaagccgt gttttgctga ccgcttgccc	4560
ggcctgcggt gaaaagcctt cccattcagg gaaggcttta atcgagttat agatct	4616
<210> 6 <211> 1899 <212> DNA <213> unknown <220> <223> restriction and modification system of Citrobacter species 21	144
<400> 6	177
atggcgaacg aacgcaaaac agaatcctta gttcgagacc agctacggac atttggctac	60
tacgaaccgg acaacggcat ttctgtagag gagcaaaagt ccgagattgt caagattaag	120
ggtttgcttt caaaagcaag taagaacgcc aagggcaata ttggttatcc cgagttcatc	180
atctctaacc ggaaagatac tgcattcctg atagttgtgg agtgcaagcc ggatgtgaaa	240
aagcacgaga gcccaagccg tgataagccg gtagactatg cggtggatgg cgttctccac	300
tacgccagac acctagccaa gcactatacc gtattggcgg tggctgtgag cggcacgacg	360
gcaagttcta tgaaggtgtc caacttcctt gtgcctgcgg gtaccacgga tgtgaaggcg	420
ctggtcaacg agagtaattc ctcagttgcc gaattggtgc cttatgatga ctactaccgc	480
ctggcgtctt atgatccgga tgttgctcag aagcgccact ctgacttgct ggcgttctca	540
cgcgagctgc acgagtttat ttggacgaag gcaaaaatct ccgaagaaga aaagcctctg	600
ctggtgagtg ggaccttgat tgcgttgatg aacaacacat tcatcaagac ctttgacgct	660
ctacctgcag aagatgtgca ggaagcgtgg ctgacggcta tcaagaagga gctggacaaa	720
gcttctatcc cccaggccaa gaaggacacg atgctgcagc cgtatacgac gattgcggtt	780
aatcccaatc ttggcaagcc tgacagcaag acggctaaag agtatccaga tggagttttc	840
aaggaaataa tcacccgcat cgccgacaac gtctggccct acatcaatgt ctttcacgac	900
tttgatgtgg tcggacaatt ctacggtgag tttctgaaat atactgcggg cgacaaaaaa	960
gcgctgggca tcgtgctgac gccgcgccat gtggctgaac tgttctcgct catcgccaac	1020
gttaacccca agtctaaggt gctggacatc tgtgcgggca cgggcggctt tctcatctcg Page 5	1080

gccatgcaac	acatgctcaa	gaaggccgta	acggacaaag	agcgcaacga	catcaagcaa	1140
aatcggctca	tcgggattga	aaacaacccc	aagatgtttg	ccttggctgc	cagcaacatg	1200
attctgcgtg	gtgatggtaa	ggctaacctg	caccaggcca	gttgctttga	taatgcagtg	1260
attgcggccg	tgcagaagat	gaagcccaac	gtgggcatgc	ttaaccccc	gtattcgcag	1320
tccaagagcg	acgcggaact	gcatgagctg	tatttcgtca	agcaaatgct	cgacacgctt	1380
acaccaggtg	gagttggtat	cgcgattgtt	cccatgtcaa	gcgccatctc	gcccaaccca	1440
atgcgtgaag	agctgatgaa	gtaccactca	ctggatgcgg	tcatgtcaat	gccccaggag	1500
ctgttttatc	cagtgggcac	ggtcacctgt	gtcatggtct	ggattgccgg	tgtgccacat	1560
gagcaaatgt	ccaagaagac	atggtttggc	tactggcgcg	acgatggctt	tgtgaaaacc	1620
aagcataagg	ggcgcatcga	catgaatggc	acctggccag	acatccgtga	ccgatggatt	1680
gaaatgtatc	gcaatcgcga	agtgcatgct	ggcgagagca	tcatgcagaa	ggtaggcccc	1740
gatgatgaat	ggtgcgctga	agcctatatg	gaaacggact	actcagtgct	gactcagtcc	1800
gactttgaga	aggtcgttca	aagctacgcg	ctatttaaac	tatttggtca	aggcagtagc	1860
cagtccgaag	tgaaaggggc	aacggatgcc	gaagattaa			1899

<210> 7 <211> 960 <212> DNA <213> unknown

<220>

<223> specificity subunit of Citrobacter species 2144

<400> atgccgaaga ttaacgacct ttttcatctg gagtacggtc acagcctgga gttgaaccgg 60 120 ctagagcaat ccacagcagc cgatgccgtc aacttcgttg gacgggcagc taggaacaat ggagtcaccg cacgcgtggc tccccctcca aacttgaaac cggcagccgc aggcaccatc 180 agcgtagcgc tgggagggca aggtggcgca ggagtcgcct tcctccaacc gcgtccctac 240 ttttgtggcc gcgatgtgat ggtgctgacc cccaagaagc acatgacaga ccaagaaaag 300 ctgtggtggg tcatgtgcat cacagccaac cgtttccgct ttggatttgg tcgccaagct 360 aatcggacgc taaaggactt gaatctgcct gcgccccaaa aaactccaag ctgggtgcat 420 480 acagcgaacc ccgatgccta ccaaggtgtc aggtcccccg caagtgttca tccagtcggc acgctggctg tgagcaactg gaaggctttc attcttcaag acttgtttac catccgtaaa 540 600 ggacaqcgac tcaccaaggc caacatgttg cccggtacgg tgccctacat cggcgcatcg gacacttcca acggcgttac tgcgcacatc gggcaaaaac caatccacga gggcggcacc 660 atcagcgtca catatgacgg ttcaatagct gaagcgtttt accagccctc cccattttgg 720

gcatcggatg	ctgtgaacgt	gctctatccc	aagggtttca	cactcacacc	ggccactgcc	780
ttgtttatct	gcgcaatcat	caggatggag	aaatatcgct	tcaactatgg	ccgaaaatgg	840
cacttagagc	gtatgcgaga	gacagttatc	aggttaccag	ctactgcaac	aggtgcacca	900
gattgggact	ttatggagaa	atacatcaaa	actttgccct	atagctcgca	gttgcaataa	960

<210> 8

<211> <212> 632

PRT

<213> unknown

<220>

predicted amino acid sequence of restriction modification system of Citrobacter species 2144

<400>

Met Ala Asn Glu Arg Lys Thr Glu Ser Leu Val Arg Asp Gln Leu Arg 1 5 10 15

Thr Phe Gly Tyr Tyr Glu Pro Asp Asn Gly Ile Ser Val Glu Glu Gln 20 25 30

Lys Ser Glu Ile Val Lys Ile Lys Gly Leu Leu Ser Lys Ala Ser Lys 35 40 45

Asn Ala Lys Gly Asn Ile Gly Tyr Pro Glu Phe Ile Ile Ser Asn Arg 50 55 60

Lys Asp Thr Ala Phe Leu Ile Val Val Glu Cys Lys Pro Asp Val Lys 65 70 75 80

Lys His Glu Ser Pro Ser Arg Asp Lys Pro Val Asp Tyr Ala Val Asp 85 90 95

Gly Val Leu His Tyr Ala Arg His Leu Ala Lys His Tyr Thr Val Leu 100 105 110

Ala Val Ala Val Ser Gly Thr Thr Ala Ser Ser Met Lys Val Ser Asn 115 120 125

Phe Leu Val Pro Ala Gly Thr Thr Asp Val Lys Ala Leu Val Asn Glu 130 135 140

Ser Asn Ser Ser Val Ala Glu Leu Val Pro Tyr Asp Asp Tyr Tyr Arg 145 150 155 160

Leu Ala Ser Tyr Asp Pro Asp Val Ala Gln Lys Arg His Ser Asp Leu 165 170 175

Leu Ala Phe Ser Arg Glu Leu His Glu Phe Ile Trp Thr Lys Ala Lys 180 185 190 Ile Ser Glu Glu Glu Lys Pro Leu Leu Val Ser Gly Thr Leu Ile Ala Leu Met Asn Asn Thr Phe Ile Lys Thr Phe Asp Ala Leu Pro Ala Glu 210 215 220 Asp Val Gln Glu Ala Trp Leu Thr Ala Ile Lys Lys Glu Leu Asp Lys 225 230 235 240 Ala Ser Ile Pro Gln Ala Lys Lys Asp Thr Met Leu Gln Pro Tyr Thr 245 250 255 Thr Ile Ala Val Asn Pro Asn Leu Gly Lys Pro Asp Ser Lys Thr Ala 260 265 270 Lys Glu Tyr Pro Asp Gly Val Phe Lys Glu Ile Ile Thr Arg Ile Ala 275 280 285 Asn Val Trp Pro Tyr Ile Asn Val Phe His Asp Phe Asp Val Val 290 295 300 Gly Gln Phe Tyr Gly Glu Phe Leu Lys Tyr Thr Ala Gly Asp Lys Lys 305 310 315 320 Ala Leu Gly Ile Val Leu Thr Pro Arg His Val Ala Glu Leu Phe Ser 325 330 335 Leu Ile Ala Asn Val Asn Pro Lys Ser Lys Val Leu Asp Ile Cys Ala 340 345 350 Gly Thr Gly Gly Phe Leu Ile Ser Ala Met Gln His Met Leu Lys Lys 355 360 365 Ala Val Thr Asp Lys Glu Arg Asn Asp Ile Lys Gln Asn Arg Leu Ile 370 380 Gly Ile Glu Asn Asn Pro Lys Met Phe Ala Leu Ala Ala Ser Asn Met 385 390 395 400 Ile Leu Arg Gly Asp Gly Lys Ala Asn Leu His Gln Ala Ser Cys Phe 405 410 415 Asp Asn Ala Val Ile Ala Ala Val Gln Lys Met Lys Pro Asn Val Gly 420 425 430 Page 8

Met Leu Asn Pro Pro Tyr Ser Gln Ser Lys Ser Asp Ala Glu Leu His 435 440 445

Glu Leu Tyr Phe Val Lys Gln Met Leu Asp Thr Leu Thr Pro Gly Gly 450 455 460

Val Gly Ile Ala Ile Val Pro Met Ser Ser Ala Ile Ser Pro Asn Pro 465 470 475 480

Met Arg Glu Glu Leu Met Lys Tyr His Ser Leu Asp Ala Val Met Ser 485 490 495

Met Pro Gln Glu Leu Phe Tyr Pro Val Gly Thr Val Thr Cys Val Met 500 505 510

Val Trp Ile Ala Gly Val Pro His Glu Gln Met Ser Lys Lys Thr Trp 515 520 525

Phe Gly Tyr Trp Arg Asp Gly Phe Val Lys Thr Lys His Lys Gly 530 540

Arg Ile Asp Met Asn Gly Thr Trp Pro Asp Ile Arg Asp Arg Trp Ile 545 550 555 560

Glu Met Tyr Arg Asn Arg Glu Val His Ala Gly Glu Ser Ile Met Gln 565 570

Lys Val Gly Pro Asp Asp Glu Trp Cys Ala Glu Ala Tyr Met Glu Thr 580 585 590

Asp Tyr Ser Val Leu Thr Gln Ser Asp Phe Glu Lys Val Val Gln Ser 595 600 605

Tyr Ala Leu Phe Lys Leu Phe Gly Gln Gly Ser Ser Gln Ser Glu Val 610 615 620

Lys Gly Ala Thr Asp Ala Glu Asp 625 630

<210> 9

<211> 319

<212> PRT

<213> unknown

<220>

<223> predicted amino acid sequence of the specificity subunit of
 Citrobacter species 2144

<400> 9 Met Pro Lys Ile Asn Asp Leu Phe His Leu Glu Tyr Gly His Ser Leu 1 5 10 15 Glu Leu Asn Arg Leu Glu Gln Ser Thr Ala Ala Asp Ala Val Asn Phe 20 25 30 Val Gly Arg Ala Ala Arg Asn Asn Gly Val Thr Ala Arg Val Ala Pro 35 40 45 Pro Pro Asn Leu Lys Pro Ala Ala Gly Thr Ile Ser Val Ala Leu 50 60 Gly Gly Gln Gly Gly Ala Gly Val Ala Phe Leu Gln Pro Arg Pro Tyr 65 70 75 80 Phe Cys Gly Arg Asp Val Met Val Leu Thr Pro Lys Lys His Met Thr 85 90 95 Asp Gln Glu Lys Leu Trp Trp Val Met Cys Ile Thr Ala Asn Arg Phe 100 105 110

Arg Phe Gly Phe Gly Arg Gln Ala Asn Arg Thr Leu Lys Asp Leu Asn 115 120 125

Leu Pro Ala Pro Gln Lys Thr Pro Ser Trp Val His Thr Ala Asn Pro

Asp Ala Tyr Gln Gly Val Arg Ser Pro Ala Ser Val His Pro Val Gly 145 150 155 160

Thr Leu Ala Val Ser Asn Trp Lys Ala Phe Ile Leu Gln Asp Leu Phe 165 170 175

Thr Ile Arg Lys Gly Gln Arg Leu Thr Lys Ala Asn Met Leu Pro Gly
180 185 190

Thr Val Pro Tyr Ile Gly Ala Ser Asp Thr Ser Asn Gly Val Thr Ala 195 200 205

His Ile Gly Gln Lys Pro Ile His Glu Gly Gly Thr Ile Ser Val Thr 210 220

Tyr Asp Gly Ser Ile Ala Glu Ala Phe Tyr Gln Pro Ser Pro Phe Trp 225 230 235 240

Ala Ser Asp Ala Val Asn Val Leu Tyr Pro Lys Gly Phe Thr Leu Thr Page 10

Pro Ala Thr Ala Leu Phe Ile Cys Ala Ile Ile Arg Met Glu Lys Tyr 260 265 270

Arg Phe Asn Tyr Gly Arg Lys Trp His Leu Glu Arg Met Arg Glu Thr 275 280

Val Ile Arg Leu Pro Ala Thr Ala Thr Gly Ala Pro Asp Trp Asp Phe

Met Glu Lys Tyr Ile Lys Thr Leu Pro Tyr Ser Ser Gln Leu Gln 310

10 <210> 23 <211> <212> DNA <213> unknown

<220> <223> synthetic

<400> 10

23 cagagagata acccacaaga ttg

<210> <211> 24 <212> DNA <213> unknown <220>

<223> synthetic

<400> 11

ccacaagaat tgagttaagc ccaa 24

12 25 <210> <211> <212> DNA <213> unknown

<220> <223> synthetic

<400> 12

atcgagagat aacccacaag aattg 25

<210> 13 <211> 25 <212> DNA <213> unknown <220>

<223> synthetic

```
<220>
<221> misc_feature
<222> (4)..(8)
<223> n=a,c,t or g
<220>
<221> misc_feature
<222> (13)..(25)
<223> n=a,c,t or g
<400> 13
                                                                                      25
caannnngt ggnnnnnnn nnnnn
<210> 14
<211> 12
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222> (4)..(8)
<223> n=a,t,c or g
<400> 14
caannnngt gg
                                                                                      12
<210> 15
<211> 21
<212> DNA
<213> unknown
<220>
<223> primer
<400> 15
                                                                                      21
cagttcgatg taacccactc g
<210> 16
<211> 23
<212> DNA
<213> unknown
<220>
<223> primer
<400> 16
                                                                                      23
cccgctgacg cgccctgacg ggc
<210> 17
<211> 43
<212> DNA
<213> unknown
<220>
```

NEB-241-PUS.ST25.txt <223> synthetic <400> 17 aagtgccacc tgacgtgcaa cctaggtggc acgtctaaga aac 43 <210> 18 <211> 43 <212> DNA <213> unknown <220> <223> synthetic <400> 18 43 gtttcttaga cgtgccacct aggttgcacg tcaggtggca ctt <210> 19 <211> <212> 44 DNA <213> unknown <220> <223> synthetic <400> 19 44 tggtttctta gacgtgccac ctaggttgca cgtcaggtgg cact <210> 20 <211> 42 <212> DNA <213> unknown <220> <223> synthetic <400> 20 tgccacctga cgtgcaacct aggtggcacg tctaagaaac ca 42 <210> 21 <211> 43 <212> DNA <213> unknown <220> <223> synthetic <400> agtgccacct gacgtgcaac ctaggtggca cgtctaagaa acc 43 <210> 22 <211> 43 <212> DNA <213> unknown

Page 13

<220>

<400> 22

<223> synthetic

```
NEB-241-PUS.ST25.txt
                                                                                   43
agtgccacct gacgtgccac ccgggttgca cgtctaagaa acc
<210>
        23
<211> 18
<212> DNA
<213>
        unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222> (7)..(7)
<223> n=a,c,t or g
<400> 23
                                                                                   18
gcaaccnggg tggcacgt
<210>
        24
<211>
       11
<212> PRT
<213> unknown
<220>
<223> synthetic
<400> 24
Val Leu Asp Ile Cys Ala Gly Thr Gly Gly Phe 1 \hspace{1cm} 10
<210> 25
<211> 10
<212> PRT
<213> unknown
<220>
<223> synthetic
<400> 25
Ala Asn Glu Arg Lys Thr Glu Glu Leu Val
1 5 10
<210> 26
<211> 11
<212> PRT
<213> unknown
<220>
<223>
        synthetic
<400> 26
Met Ala Asn Glu Arg Lys Thr Glu Ser Leu Val 1 5 10
```

```
NEB-241-PUS.ST25.txt
<210> 27
<211> 10
<212> PRT
<213> unknown
<220>
<223> synthetic
<400> 27
Pro Lys Ile Asn Asp Leu Phe His Leu Glu 1 10
<210> 28
<211> 11
<212> PRT
<213> unknown
<220>
<223> synthetic
<400> 28
Met Pro Lys Ile Asn Asp Leu Phe His Leu Glu 1 \hspace{1cm} 5 \hspace{1cm} 10
<210> 29
<211> 12
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222> (5)..(8)
<223> n=a,c,t or g
<220>
<221> misc_feature
<222> (9)..(9)
<223> n is a, c, g, or t
<400> 29
ccacnnnnnt tg
<210> 30
<211> 36
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature <222> (1)..(11)
```

Page 15

12

```
NEB-241-PUS.ST25.txt
<223> n=a,c,t or g
<220>
<221>
<222>
<223>
       misc_feature
        (15)..(19)
        n=a,c,t or g
<220>
<221>
<222>
        misc_feature
       (24)..(36)
<223>
        n=a,c,t or g
<400> 30
nnnnnnnn ncaannnng tggnnnnnn nnnnn
                                                                                  36
<210>
        31
       34
<211>
<212>
       DNA
<213>
        unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222>
<223>
       (1)..(10)
        n=a,c,g or t
<220>
<221> misc_feature <222> (14)..(18)
       (14)..(18)
<223> n=a,c,g or t
<220>
<221> misc_feature
<222> (23)..(34)
<223>
        n=a,c,g or t
                                                                                  34
nnnnnnnnn caannnngt ggnnnnnnn nnnn
        32
35
<210>
<211>
<212>
        DNA
<213>
        unknown
<220>
<223>
       synthetic
<220>
<221>
<222>
<223>
        misc_feature
        (1)..(10)
        n=a,c,t or g
<220>
<221>
        misc_feature
<222> (14)..(18)
<223> n=a,c,t or g
```

```
<220>
<221> misc_feature
<222> (23)..(35)
<223> n=a,c,t or g
       misc_feature
(23)..(35)
<400> 32
                                                                                       35
nnnnnnnnn caannnnngt ggnnnnnnnn nnnnn
<210> 33
<211> 35
<211> 35
<212> DNA
<213>
        unknown
<220>
<223>
        synthetic
<220>
<221> misc_feature
<222> (1)..(11)
<223> n=a,c,t or g
<220>
        misc_feature
<221>
<222>
        (15)..(19)
<223>
        n=a,c,t or g
<220>
<221>
<222>
       misc_feature (24)..(35)
<223> n=a,c,t or g
<400> 33
                                                                                       35
nnnnnnnnn ncaannnnng tggnnnnnnn nnnnn
<210>
        34
<211> 13
<212> DNA
<213>
        unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222>
        (4)..(9)
<223> n=a,c,t or g
<400> 34
caannnnnng tgg
                                                                                       13
<210>
        35
<211>
        11
<212>
        DNA
<213>
        unknown
<220>
<223> synthetic
```

```
<220>
<221> misc_feature
<222> (4)..(7)
<223> n=a,c,g or t
<400> 35
                                                                                                     11
caannnngtg g
<210> 36
<211> 11
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222> (4)..(8)
<223> n=a,c,t or g
<400> 36
                                                                                                     11
caannnnntt g
<210> 37
<211> 13
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature
<222> (5)..(9)
<223> n=a,c,t or g
<400> 37
                                                                                                     13
ccacnnnnng tgg
<210> 38
<211> 12
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature <222> (4)..(4)
<223> n is a, c, g, or t
<220>
<221> misc_feature
<222> (5)..(8)
```

NEB-241-PUS.ST25.txt <223> n=a,c,t or g <220> <221> misc_feature <222> (12)..(12) <223> r=a or g <400> 38 12 caannnnngt gr <210> 39 <211> 11 <212> DNA <213> unknown <220> <223> synthetic <220> <220> <221> misc_feature <222> (4)..(8) <223> n=a,c,t or g <400> 39 11 caannnnngt g <210> 40 <211> 11 <212> DNA <213> unknown <220> <223> synthetic <220> <221> misc_feature <222> (4)..(8) <223> n=a,c,t or g <400> 40 11 cgannnnntg c <210> 41 <211> 11 <212> DNA <213> unknown <220> <223> synthetic <220> <221> misc_feature <222> (4)..(8) <223> n=a,c,t or g

Page 19

11

<400> 41 caannnntg c

```
<210>
        42
<211>
       12
<212> DNA
<213> unknown
<220>
<223> synthetic
<220>
<221> misc_feature <222> (4)..(8)
<223> n=a,c,t or g
<400> 42
                                                                                      12
gcannnnngt gg
<210> 43
<211> 12
<212> DNA
<213> Bacillus coagulans
<220>
<221> misc_feature
<222> (4)..(9)
<223> n=a,c,t or g
<400> 43
                                                                                      12
cgannnnnnt gc
<210> 44
<211> 11
<212> DNA
<213> Bacillus sphaericus
<220>
<221> misc_feature
<222> (3)..(6)
<223> n=a,c,t or g
<220>
<221> misc_feature
<222> (10)..(10)
<223> y=c or t
<400> 44
acnnnngtay c
                                                                                      11
<210> 45
<211>
       11
<212> DNA
<213> Bacillus pumilus
<220>
<221> misc_feature
```

NEB-241-PUS.ST25.txt <222> (4)..(8) <223> n=a,c,g or t <400> 45 11 gagnnnnnct c <210> 46 <211> 11 <212> DNA <213> Campylobacter jejuni <220> <221> misc_feature <222> (4)..(9) <223> n=a, c, t or g <400> 46 ccannnnnng t 11 <210> 47 <211> 13 <212> DNA <213> Acinetobacter lwoffii <220> <221> misc_feature <222> (5)..(10) <223> n=a, c, t or g <400> 47 gaacnnnnnn tcc 13 <210> 48 <211> 11 <212> DNA DNA <213> Haemophilus aegyptius <220> <221> misc_feature <222> (3)..(3) <223> y=c or t <220> <221> misc_feature <222> (4)..(8) <223> n=a,c,t or g <220> <221> <222> misc_feature (9)..(9)<223> r=a or g

<210> 49

<400> 48

gaynnnnnrt c

11

```
<211> 11
<212> DNA
<213> Bacillus stearothermophilus

<220>
<221> misc_feature
<222> (3)..(7)
<223> n=a,c, t or g

<400> 49
acnnnnnctc c
```